



## The employment outlook for occupations tasked with building America's infrastructure

*By Patricia Tate*

Infrastructure plays an essential role in the U.S. economy because it includes facilities and structures that help the nation function. These facilities and structures are local roads and highways, bridges, airports, phone lines, water and sewage treatment facilities, and power generating facilities. This **Beyond the Numbers** article uses Bureau of Labor Statistics (BLS) data to examine long-term employment projections, education and training requirements, and wages for selected occupations that are involved in building, maintaining, repairing, and inspecting infrastructure in the United States. These occupations include those that make plans and designs, prepare worksites for building activities, build the infrastructure, and inspect and monitor the construction. Infrastructure-

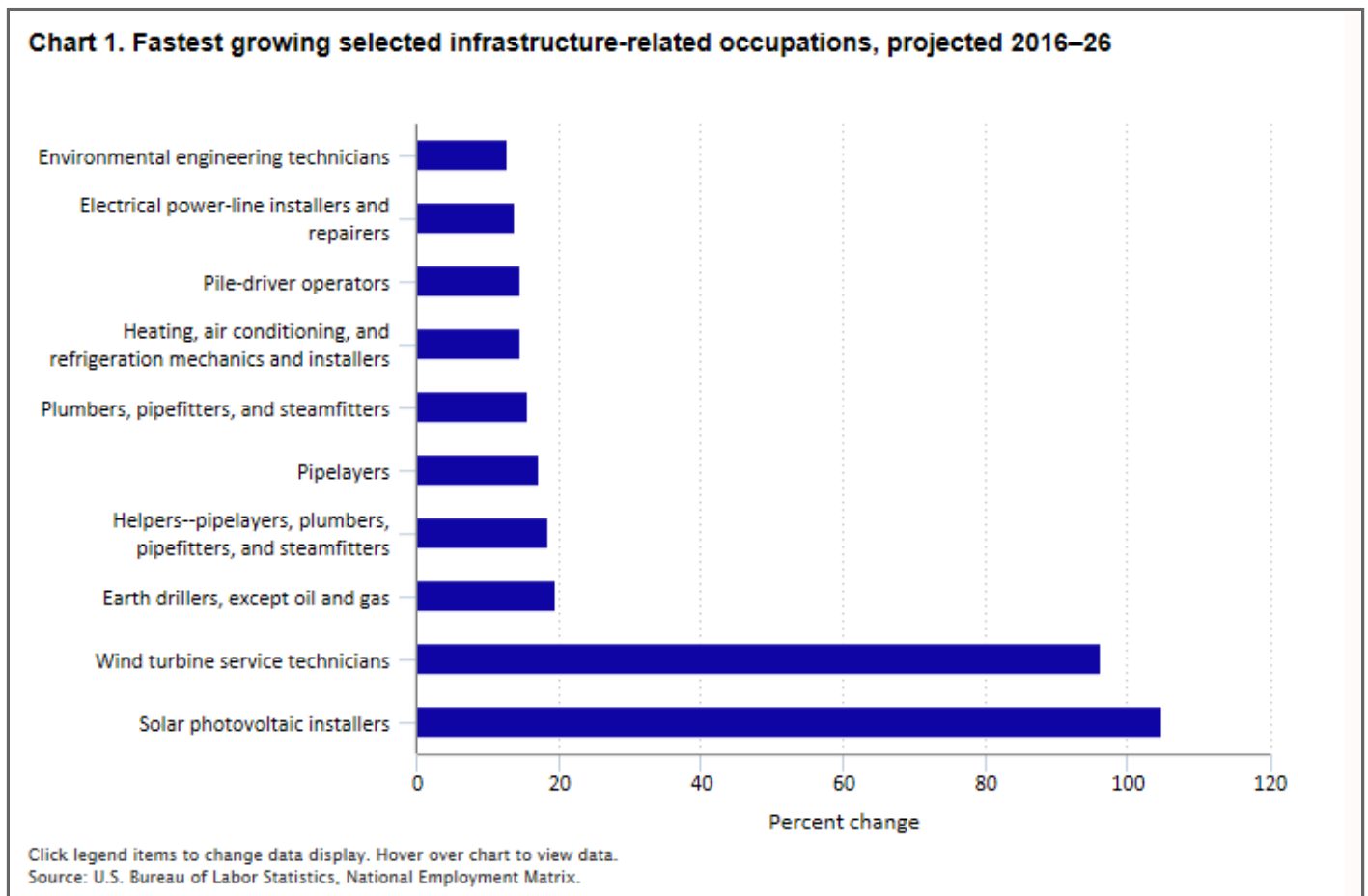
related occupations provide good opportunities: most are projected to grow faster than the average, and wages are generally higher than the median.

## Infrastructure-related occupations

Different occupations are involved in different phases of infrastructure projects. For example, constructing roads, bridges, and airports starts with workers who create the plans and designs. These workers include civil engineers, environmental engineers, architects, cost estimators, and surveyors. Another phase involves preparation workers who make worksites ready for construction. Their tasks include drilling into and moving earth, dredging, and pile driving. Other workers, including those in construction trades and those who operate construction equipment, are involved in building and maintaining the structure. And another group of workers has tasks of monitoring and inspecting the building of the infrastructure and the workers themselves.

## Fastest growing occupations

As interest in using alternative forms of energy increases, solar photovoltaic installers and wind turbine service technicians are projected to be the two fastest growing occupations in the group of selected infrastructure-related occupations and in the overall economy. Chart 1 shows projected growth of 104.9 percent for solar photovoltaic installers and 96.3 percent for wind turbine service technicians from 2016 to 2026.

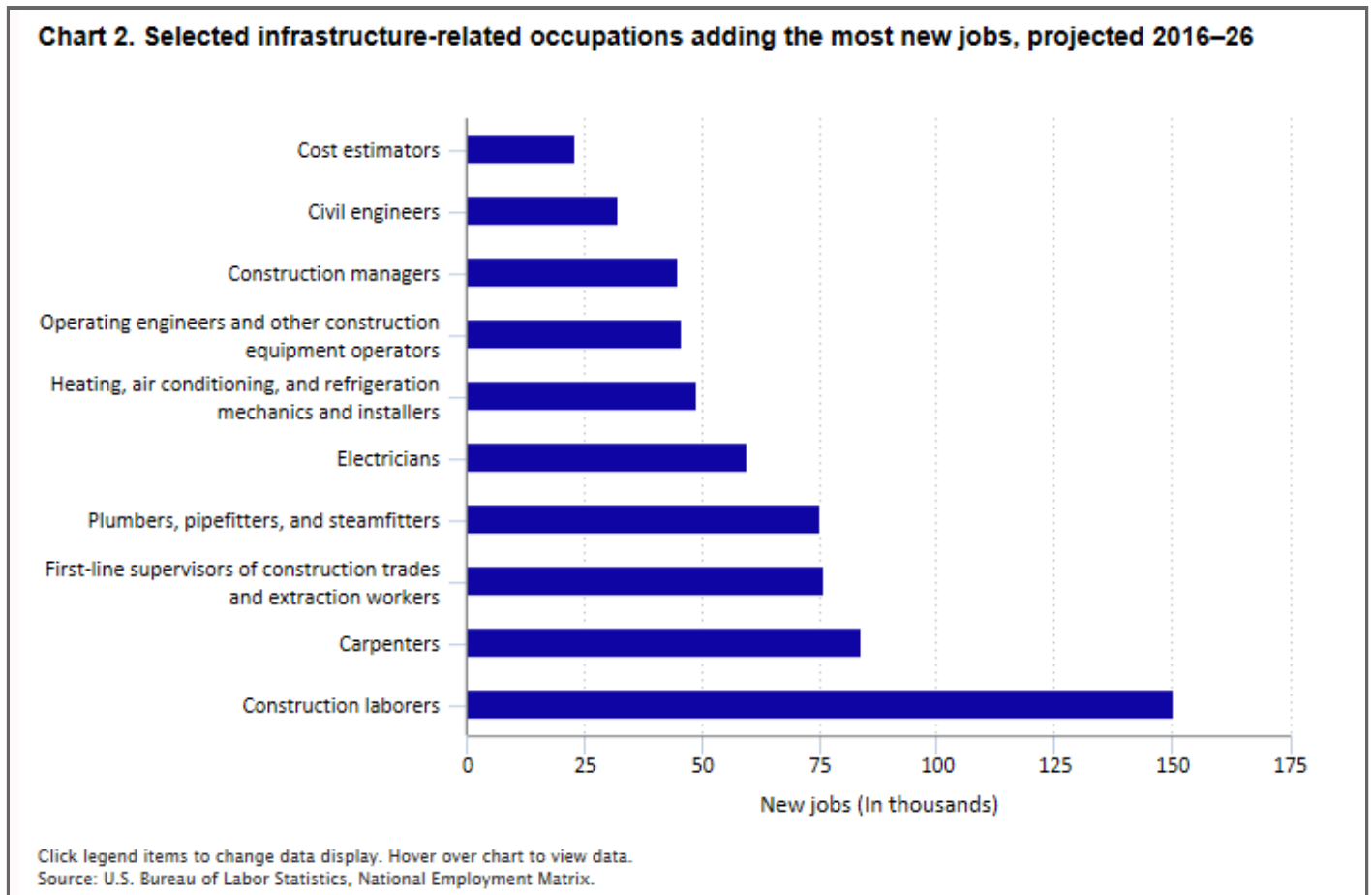


However, fast occupational growth may not lead to many new jobs. Wind turbine service technicians, for example, is a small occupation in terms of employment size, and the projected fast growth will only lead to 5,600 new jobs over the 10-year period.

Environmental engineering technicians is the only occupation on this chart that typically needs a postsecondary degree for entry. They work directly with environmental engineers to prevent, remediate, and control environmental hazards. When involved in building infrastructure, these technicians research the environmental impact of construction projects and work on plans to build water and wastewater systems, for example. State and local governments are likely to focus their efforts and resources on efficient water use, storm waste management, and wastewater treatment over the next decade.

## Most new jobs

Construction laborers are projected to add the most new jobs among the selected infrastructure-related occupations— 150,400 new jobs from 2016 to 2026. This is also the largest of the selected infrastructure-related occupations in terms of employment size, and these workers perform various physical labor tasks at construction jobsites. Other occupations that build the structure make this top 10 list, including carpenters; plumbers, pipefitters, and steamfitters; and electricians. (See chart 2.)



Among the occupations projected to add the most new jobs are civil engineers and cost estimators. Civil engineers plan, design, and manage or oversee projects to repair, upgrade, or rebuild airports, bridges, roads, and other

structures. Cost estimators provide managers estimates of the costs associated with the projects to repair, upgrade, or rebuild the infrastructures.

## Typical entry-level education and training requirements

BLS provides information about typical entry-level education and training requirements for hundreds of occupations.<sup>1</sup> The selected infrastructure-related occupations have a wide range of typical education requirements. (See exhibit 1 for examples of education and training requirements.)

**Exhibit 1. Typical entry-level education and training requirements in selected infrastructure-related occupations, 2016**

Infrastructure Group	Occupation	SOC	Typical entry-level education	Work experience in a related occupation	On-the-job training <sup>(1)</sup>
Plan/design	Landscape architects	17-1012	Bachelor's degree	None	Internship/residency
Plan/design	Civil engineers	17-2051	Bachelor's degree	None	None
Monitor/inspect	Construction managers	11-9021	Bachelor's degree	None	Moderate-term on-the-job training
Plan/design	Architectural and civil drafters	17-3011	Associate's degree	None	None
Plan/design	Environmental engineering technicians	17-3025	Associate's degree	None	None
Structure	Wind turbine service technicians	49-9081	Postsecondary nondegree award	None	Long-term on-the-job training
Structure	Commercial divers	49-9092	Postsecondary nondegree award	None	Moderate-term on-the-job training
Preparation	Earth drillers, except oil and gas	47-5021	High school diploma or equivalent	None	Moderate-term on-the-job training
Structure	Solar photovoltaic installers	47-2231	High school diploma or equivalent	None	Moderate-term on-the-job training
Structure	Sheet metal workers	47-2211	High school diploma or equivalent	None	Apprenticeship
Structure	Electrical power-line installers and repairers	49-9051	High school diploma or equivalent	None	Long-term on-the-job training
Monitor/inspect	First-line supervisors of construction trades and extraction workers	47-1011	High school diploma or equivalent	5 years or more	None
Preparation	Pipelayers	47-2151	No formal educational credential	None	Short-term on-the-job training

Footnotes:

<sup>(1)</sup> On-the-job training indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation. Short-term on-the-job training lasts for less than 1 month, moderate-term on-the-job training from 1–12 months, and long term on-the-job training is longer than 1 year.

Source: Bureau of Labor Statistics, National Employment Matrix.

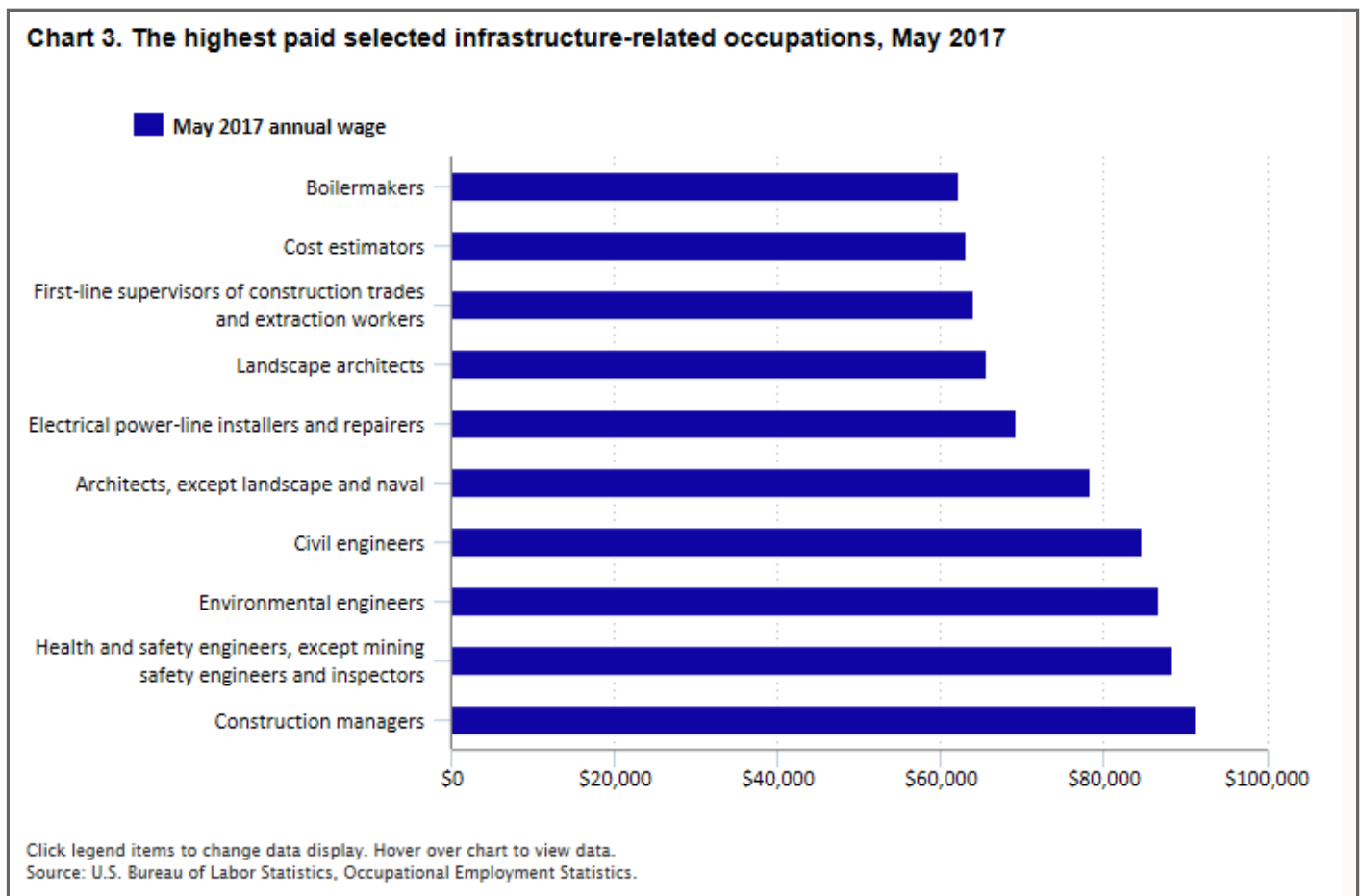
Most infrastructure-related occupations that require workers to have a bachelor’s degree are involved in planning and designing infrastructure projects. These include civil engineers and environmental engineers, along with surveyors, landscape architects, and architects, except landscape and naval, who also typically need to complete a paid internship, because an internship is generally required to obtain licensure. Two occupations that work to monitor and inspect infrastructure construction also typically require a bachelor’s degree for entry—construction managers and health and safety engineers.

Other infrastructure-related occupations typically require postsecondary education, but less than a bachelor’s degree. Some of these workers are involved in planning and design, such as architectural and civil drafters, civil engineering technicians, and environmental engineering technicians, and they typically enter the occupations with an associate’s degree. A postsecondary nondegree award is typically needed by a few occupations that work on the structure, including wind turbine service technicians and commercial divers.

Most infrastructure-related occupations that prepare the worksite or build the structure typically require workers to have a high school diploma or equivalent to enter the occupation. They include construction trades workers, such as sheet metal workers, carpenters, and brickmasons and blockmasons. Several of these occupations also typically require workers to complete an apprenticeship. An apprenticeship consists of a combination of on-the-job training and technical instruction, which usually lasts from 3 to 5 years.

## Wages for infrastructure occupations

Overall, infrastructure-related occupations pay well. Most have median annual wages higher than the median for all occupations, which was \$37,690 in May 2017. Occupations that typically require a bachelor’s degree for entry account for 7 out of the top 10 highest paid infrastructure-related occupations. Construction managers is the highest paid occupation among the selected infrastructure-related occupations, with an annual median wage of \$91,370. (See chart 3.)



Three out of the top 10 highest paid infrastructure-related occupations—electrical power-line installers and repairers, first-line supervisors of construction trades and extraction workers, and boilermakers—have an entry-level education requirement of a high school diploma or equivalent. These three occupations, however, also need additional preparation to be competent in performing the tasks of the occupations. Electrical power-line installers and repairers typically need on-the-job training of longer than 1 year, and boilermakers usually serve an apprenticeship. First-line supervisors of construction trades and extraction workers typically need 5 years or more of construction-related experience.

## Conclusion

The selected infrastructure-related occupations include a wide range of occupations with varying types of preparation needed for entry. Most of them also pay more than the annual median wage for all occupations, and nearly all are projected to grow at least as fast as the average from 2016 to 2026. The nation's demand for new infrastructure and the maintenance and improvements of existing infrastructure will help to drive the demand for these occupations.

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### NOTES

<sup>1</sup> Note that actual educational attainment among workers may be higher or lower than the typical entry-level assignment for the occupation. For more information, see: <https://www.bls.gov/emp/documentation/education-training-system.htm>.

### SUGGESTED CITATION

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